DOCUMENT RESUME

ED 233 906 SE 042 818

AUTHOR Thomas, Gail E.
TITLE Math Readiness and Preparation for Competitive College Majors and Careers: The Case of Black Students.
INSTITUTION Johns Hopkins Univ., Baltimore, Md. Center for Social Organization of Schools.
SPONS AGENCY National Inst. of Education (ED), Washington, DC.
REPORT NO CSOS-R-343
PUB DATE Jul 83
GRANT NIE-G-83-0002
NOTE 32p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Black Students; *Career Planning; College Preparation; *College Students; Educational Research; *Enrollment Influences; Higher Education; High Schools; Majors (Students); Mathematics Instruction; Readiness; *Secondary School Mathematics; Sex Differences; *Student Attitudes
IDENTIFIERS *Mathematics Education Research

ABSTRACT

This study examines factors that determine the enrollment of black students in the high school math courses (i.e., advanced algebra, trigonometry, calculus) that are necessary for competitive college and major field access. The data are from a local college survey of juniors and seniors who were enrolled in eight (8) local public and private colleges in Maryland, Georgia, and the District of Columbia. Approximately 2,100 students participated in the survey. Forty-six percent (927) of the students were black. The study found that, after controlling for parental education and high school grade performance, math affinity (the extent to which black students liked high school math) was the single most important factor that significantly influenced the enrollment of black students in advanced high school math courses. Neither blacks nor whites expressed a great affinity (i.e., indicating that they liked high school math "very much") for high school math. (Author)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

✓ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Report No. 343
July 1983

MATH READINESS AND PREPARATION FOR COMPETITIVE COLLEGE MAJORS AND CAREERS: THE CASE OF BLACK STUDENTS

Gail E. Thomas

The Johns Hopkins University

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

J. Hollifield

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

STAFF

Edward L. McDill, Co-Director
James M. McPartland, Co-Director

Karl L. Alexander
Henry J. Becker
Jomills H. Braddock, II
Shirley Brown
Ruth H. Carter
Michael Cook
Robert L. Crain
Doris R. Entwisle
Joyce L. Epstein
James Fennessey
Denise C. Gottfredson
Gary D. Gottfredson
Linda S. Gottfredson
Edward J. Harsch
John H. Hollifield
Barbara J. Hucksoll
Ramona M. Humphrey
Lois G. Hybl
Helene M. Kapinos
Nancy L. Karweit
Hazel G. Kennedy
Marshall B. Leavey
Gretchen M. Luebbe
Nancy A. Madden
Kirk Nabors
Alejandro Portes
Donald C. Rickert, Jr.
Laura Hersh Salganik
Robert E. Slavin
Jane St. John
Valarie Sunderland
Gail E. Thomas
William T. Trent

MATH READINESS AND PREPARATION FOR COMPETITIVE COLLEGE MAJORS AND CAREERS: THE CASE OF BLACK STUDENTS

Grant No. NIE-G-83-0002

Gail E. Thomas

Report No. 343

July 1983

Published by the Center for Social Organization of Schools, supported in part as a research and development center by funds from the National Institute of Education, U.S. Department of Education. The opinions expressed in this publication do not necessarily reflect the position or policy of the National Institute of Education, and no official endorsement by the Institute should be inferred.

Center for Social Organization of Schools
The Johns Hopkins University
3505 North Charles Street
Baltimore, MD 21218

Printed and assembled by the Centers for the Handiacpped
Silver Spring, MD

The Center

The Center for Social Organization of Schools has two primary objectives: to develop a scientific knowledge of how schools affect their students, and to use this knowledge to develop better school practices and organization.

The Center works through three research programs to achieve its objectives. The School Organization Program investigates how school and classroom organization affects student learning and other outcomes. Current studies focus on parental involvement, microcomputers, use of time in schools, cooperative learning, and other organizational factors. The Education and Work Program examines the relationship between schooling and students' later-life occupational and educational success. Current projects include studies of the competencies required in the workplace, the sources of training and experience that lead to employment, college students' major field choices, and employment of urban minority youth. The Delinquency and School Environments Program researches the problem of crime, violence, vandalism, and disorder in schools and the role that schools play in delinquency. Ongoing studies address the need to develop a strong theory of delinquent behavior while examining school effects on delinquency and evaluating delinquency prevention programs in and outside of schools.

The Center also supports a Fellowships in Education Research program that provides opportunities for talented young researchers to conduct and publish significant research and encourages the participation of women and minorities in research on education.

This report, prepared by the Education and Work Program, examines the enrollment of black students in advanced high-school math courses.

Abstract

This study examines factors that determine the enrollment of black students in the high school math courses (i.e., advanced algebra, trigonometry, calculus) that are necessary for competitive college and major field access. The data are from a local college survey of juniors and seniors who were enrolled in eight (8) local public and private colleges in Maryland, Georgia, and the District of Columbia. Approximately 2,100 students participated in the survey. Forty-six percent (927) of the students were black.

The study found that, after controlling for parental education and high school grade performance, math affinity (the extent to which black students liked high school math) was the single most important factor that significantly influenced the enrollment of black students in advanced high school math courses. Neither blacks nor whites expressed a great affinity (i.e., indicating that they liked high school math "very much") for high school math.

Introduction

Career aspirations and college major selection have important consequences for educational and occupational attainment (Angle and Wissman, 1981; Davis, 1965). Students who aspire to and prepare themselves for careers in the natural sciences, business, and math related fields (i.e. mathematics, engineering, computer sciences, physics) earn higher salaries and enter more competitive occupations than do students who pursue the social sciences and other more traditional careers (Vetters, 1977; Metz, Stafford A. and Charles H. Hammer, 1981; College Placement Council, 1982).

From the 1950's to the present, black students have held conventional and "acceptable" occupational aspirations and have subsequently enrolled disproportionately in less competitive college majors (Gurin and Epps, 1975; Brown and Stent, 1977; Thomas, 1980). The selection of traditional and less marketable majors is one factor that has contributed to race and sex income and occupational segregation (Kahne and Kohen, 1975; Angle and Wissman, 1981).

In recent investigations to assess factors that influence students' college major choice, Thomas (1981; 1983) found that adequate high school math course preparation was a primary factor that affected choice of a math-based or natural science major. Sells (1980) also noted the importance of high school math preparation for college and career access. She made the following observation:

> Students whose arithmetic skills are too far below grade level in high school are effectively barred from access to the first year of high school algebra, which is the minimal mathematics preparation required by most colleges and universities. Students who have had three and a half to four years of high school mathematics are immediately eligible for the standard freshman calculus sequence at any college or university in the country. Until very recently

> those students who had not pursued second year algebra and trigonometry in high school had no way of catching up before entering as freshmen, to qualify for the standard calculus sequence, which is required for undergraduate majors in every field except education, criminology, the social sciences, and the humanities. These fields have almost no current jobs related potential for persons with a bachelor's degree (Sells, 1980).

The Carnegie Commission on Higher Education (1973) further reported that increased minority exposure to and participation in math is crucial for equalizing the educational and career outcomes of race and sex groups. Given the importance of high school math preparation for major field choice, and for competitive college and career access, this paper examines the factors that determine the enrollment of black students in advanced high school math courses.

Sample and Methodology

Data

The data for this analysis are a subsample of black college students who participated in a 1982 Spring local survey of black and white four-year college juniors and seniors. The survey was conducted by the author and involved approximately 2,100 students who were juniors and seniors in the Spring of 1982. These students were enrolled in eight four-year colleges and universities in Maryland, Georgia, and the District of Columbia. They were officially enrolled in one of eleven majors: (1) Education, (2) Social Work, (3) Sociology, (4) Psychology, (5) Economics, (6) Business Management, (7) Accounting, (8) Biology, (9) Chemistry, (10) Mathematics, and (11) Engineering. Forty-five percent of the student participants in the study were black. Eighty-six percent of these were enrolled in the five predominantly black institutions that participated in the study, and fourteen percent were enrolled in the three predominantly white participating institutions.

Students completed a seventy-eight item questionnaire that was mailed to them or distributed to them on campus. The survey inquired about their early childhood, family and elementary school experiences; their high school, academic, and extracurricular activities; their educational, family and career values and aspirations; and the reasons for the choice of their current college major.

Variables and Relevant Literature

The dependent variable in this study is High School Math Preparation (Math Prep). It consists of three items that indicated whether respondents had taken three upper-level high school math courses: advanced algebra, trigonometry, and calculus. Respondents who had taken these courses were scored 1 for each course that they had taken and 0 for each course that they had not taken. The responses to these three items were summed and weighted.

Studies have indicated that the type rather than the amount of high school math courses taken is the critical factor that stratifies students into different types of colleges and college curriculums (Sells, 1980; Sherman and Fennema, 1977). Blacks and females are less likely to enroll in advanced math courses than are whites and males (Brush, 1980; Sells, 1980; Thomas, 1983). Also, students who enroll in and complete advanced high school math courses are more likely to pursue math-related majors and more competitive college majors than are students who do not (Meece, et al., 1982; Thomas, 1983).

Independent Variables

The independent variables in the study are:

Mother's and Father's Education - Respondents were asked to indicate the highest level of education obtained by their mothers and fathers,

ranging from "less than high school graduation" to "graduate or professional school education." Findings by Werts (1966) and others (Davis, 1966; Sells, 1980; Casserly, 1980) indicate that students from families with high educational and occupational resources are more likely than students from lower family status backgrounds to pursue math-based and natural science college majors, and to take the advanced high school math and science courses required for these fields.

High School Control and High School Race - High school control pertains to whether the school is public or private. Coleman et al. (1981) reported that students in private high schools have greater access to college-preparatory curriculum and advanced math and science courses than do students in public high schools. Regarding high school race, Thomas (1983) found that a higher percentage of students from predominantly white high schools than predominantly black high schools select math-based majors. Also, Marrett (1981), Jackson (1982), and others (Young, 1983) have reported that the poor quality of math and science curriculums in inner-city, low-income, predominantly black high schools inhibits black student access to more competitive colleges and college majors.

Exposure to Math Role Models - This four-item index asked respondents if they knew, when growing up, any black, white, male or female mathematicians. Students who responded "yes" were coded (1) and students who responded "no" were coded (0). Responses to the four items were summed and weighted.

Malcom, Hall, and Brown (1976) and Blackwell (1981) reported that exposure to relevant professional role models is essential for increasing the participation of women and minorities in scientific and technical careers. Studies have also shown that females and blacks are less likely than males and whites to be encouraged by parents, counselors, and teachers to pursue math and math-related careers (Haven, 1971; Parson, Alder and Kaczala, 1983; Sells, 1980).

High School Study Time - Few studies have examined the impact of students' study habits on their academic performance, curriculum placement, and educational achievement. However, Thomas and Braddock (1981) found that students who indicated a high commitment to studying in high school were more likely to attend select colleges and private colleges than were students who had a low commitment to studying in high school.

High School Curriculum - Respondents indicated whether they were enrolled in an academic high school curriculum (coded 1) or a vocational or other non-academic high school curriculum (coded 0). Studies have consistently shown that blacks and females are overrepresented in vocational and non-college high school curriculums (Rosenbaum, 1976; Persell, 1977; Sells, 1980). These non-academic tracks restrict the access of blacks to competitive colleges and college majors.

High School Grades - Respondents indicated the letter grade that best described their high school academic performance. The response categories ranged from mostly A (coded 5) to mostly E or F (coded 1). Students who take advanced math courses and who pursue math-related majors have higher math aptitudes and higher academic grade performance than students who major in the social sciences and more traditional college majors (Davis, 1965; Werts, 1966; Benbow and Stanley, 1980). Also, high grade performance in general high school math is an important prerequisite for enrollment and successful performance in advanced high school math (Sells, 1980; Matthews, 1983).

Affinity for Math - On this Likert-type item, respondents indicated the extent to which they liked math during high school. Response categories ranged from "very much" (5) to "not at all" (1). Students' interest in math and whether they perceive it as relevant to their

educational, occupational, and social aspirations affects their enrollment in math and math-related majors (Fox and Denham, 1974; Astin, 1974; Thomas, 1980).

Educational and Occupational Expectations - Educational Expectations is a four-category item that asked respondents to indicate the highest level of education they expect to attain. Response categories ranged from "do not expect to graduate from college" to "expect to obtain an advanced graduate or professional degree." The Occupational Expectations item asked respondents to indicate, from a list of occupations, the job that they expect to get upon completing their education. This information was coded into Duncan SEI scores. Davis (1965) and others (Angrist and Almquist, 1975; Fox, 1976; Thomas, 1979) reported that the educational and career aspirations of students are important determinants of their major field choice, their pre-college academic preparation, and their educational and occupational attainment.

Hypothesis and Analysis

It is hypothesized that the enrollment and participation of black students in advanced math high school programs are influenced by the interplay of four sets of variables: (1) family and school-climate characteristics (parental education, high school race, high school control, high school curriculum), (2) exposure to and encouragement by family and school socialization agents (i.e., parents, teachers, peers), (3) academic factors (math aptitude, high school grade performance); and (4) student affective and aspirational factors (affinity and interest in math; educational and occupational expectations).

Figure 1 displays the variables and their hypothesized influence on high school math preparation. Mother's and father's education are the

---

Figure 1 About Here

---

major background or exogenous variables which influence all other variables in Figure 1. In addition, each of the remaining independent variables are hypothesized to have a direct and indirect effect on advanced high school math enrollment.[1] However, affinity for high school math--the extent to which black students like high school math--is hypothesized to be the most important variable affecting advanced high school math enrollment after parental education, high school race, high school control, high school curriculum, and high school grade performance are controlled. Thomas (1983) found that preparing for a job/career of interest was the most important reason given by black and white college students for selecting their specific college major. Also, past studies have shown that having an interest in math is a primary determinant of math enrollment and math performance (Wise, 1978; Astin, 1974). Thus, math affinity is hypothesized to be a critical factor affecting the enrollment of black students in advanced high school math courses.

Statistical Analysis

Multiple regression analyses (Kerlinger and Pedhazur, 1973) are used to analyze the effects of the independent variables on the dependent variables. This step-wise multivariate procedure examines the joint and separate contributions of the independent variables to the variation in the dependent variable. The model in Figure 1 is analyzed first for the total sample of black students, then analyzed for black students in predominantly black colleges, black students in predominantly white colleges,

[1]The relationships between the independent variables are not examined, given the primary interest in the effects of these variables on the major dependent variable, high school math preparation.

and for black males and black females when black and white college students are combined.[2]

Findings

Table 1 presents the regression analysis results for the total sample. Table 2 shows item means and standard deviations. The first

---

Table 1 About Here

---

five columns of Table 1 show the effects of various independent variables when other independent variables are included or not included in the equations.[3] The last column in the table (column 6) includes all the independent variables in the regression equation.

As was hypothesized, math affinity is the single most important predictor of taking advanced high school math, with a significant direct effect of .246 (column 6). Math affinity also has a significant indirect (cols. 4 and 5) effect on high school math preparation.

Other significant predictors of high school math preparation for blacks shown in column 6 are high school grade performance (.182), father's education (.126), high school curriculum (.122), educational expectations (.120), sex (.115), and encouragement to pursue math (.107). The positive impact of sex (males coded 1; females coded 0), and the means on math preparation for black males and females in Table 2, indicate that a higher percentage of black males than black females took advanced high school math courses.

---

[2]The subsample of blacks was not large enough to assess the research model separately for males and females within predominantly black vs. predominantly white colleges.

[3]Each column (Columns 1-6) represents a single regression equation with different combinations of predictor variables included.

Table 1 also shows that some variables hypothesized to affect advanced high school math enrollment were not significant for the total sample. These variables include mother's education, high school race, high school control, exposure to math role models, high school study time, and occupational expectations.

Tables 3 and 4 examine the relationship between the dependent and independent variables for blacks in predominantly black colleges versus blacks in predominantly white colleges, and for males and females. Studies have shown that the educational, occupational and career experiences differ for black students who attend predominantly black versus predominantly white schools (Crain, 1970, 1978; Braddock and McPartland, 1979). Also, sex differences have been found in math and science enrollment and achievement, and in the educational and occupational attainment of students (Rosenfeld, 1980; Meece et al., 1982; Thomas, Gordon and Baldwin, 1983).

Recent attempts to understand the nature of race and sex differences in career orientations and attainment outcomes have entailed analyzing separate regression models for race and sex groups based on significant race and/or sex interactions found (Portes and Wilson, 1976; Thomas, Alexander and Eckland, 1979; Thomas, 1981; Thomas, Gordon and Baldwin, 1983). Thus, the model in Figure 1 is analyzed separately for blacks in predominantly black and predominantly white colleges and analyzed separately for males and females to determine if the findings for the total sample hold for these subgroups.

Table 3 presents the results based on the full equation (i.e., with all variables included in the model) for black students in predominantly black colleges and for black students in predominantly white colleges. The top coefficients in the table are unstandardized values, which are useful for between-group comparisons. The bottom coefficients are

---

Table 3 About Here

---

standardized regression (beta) coefficients, which can be used to compare variables within groups. For example, a comparison of the standardized beta coefficients shows that math affinity is the most influential variable affecting advanced math course preparation for black students in predominantly black (.248) and in predominantly white (.267) colleges. Thus, the original hypothesis concerning the importance of math affinity for enrollment in advanced high school math also applies to black students in predominantly black colleges and in predominantly white colleges.

Comparisons of the unstandardized coefficients show that the impact of math affinity on high school math preparation is the same for black students in predominantly black (.062) and predominantly white (.062) colleges. (The means in Table 2 also suggest that black students in predominantly black and white colleges expressed a similar affinity towards high school math--both groups indicated that they liked high school math "a little" to "somewhat").[4] However, the Table 2 means indicate that a slightly higher percentage of black students in predominantly white colleges were enrolled in high school academic curriculums, took advanced high school math, and had higher high-school grade-point averages than did black students in predominantly black colleges.

High school grade performance has the second largest effect on advanced high school math enrollment for blacks in predominantly black (.168) and predominantly white colleges (.272). However, the unstandardized values suggest that the impact of high school grade performance is stronger for

---

[4]Analysis for whites showed that like blacks, whites also expressed a moderate degree of interest (i.e., "a little" to "somewhat" affinity towards math) in high school math. This suggests that the interest and appreciation of black and white students in math may require improvement.

blacks in white colleges (.144) than for blacks in black colleges (.083). Father's education is the third most influential variable affecting high school math preparation for blacks in black colleges (.156), while high school curriculum (.248) and mother's education (.208) are the next two most influential variables for blacks in white colleges. Also, the effects of curriculum (i.e., being in an academic curriculum) on advanced math course enrollment is much stronger for black students in white colleges (.248) than for blacks in black colleges (.107).

A final striking comparison concerns the effects of sex. The means in Table 2 for black males and females indicate that a higher percentage of males than females took advanced high school math courses, and Table 3 shows that the positive effect of sex (which indicates a male advantage in advanced high school math enrollment) is significant for blacks in black colleges (.121) but notsignificant for blacks in white colleges. Thus the sex disparity favoring males in advanced high school math enrollment is greater among black students in black colleges than among black students in white colleges.

Table 4 About Here

Table 4 compares black males and black females. These results also show the primary role of math affinity on high school math preparation for both sex groups. Math affinity is the strongest determinant of high school math preparation for black males (.346), and the second most important determinant for black females (.197). However, the unstandardized values suggest that its impact is almost twice as great for black males (.083) than for black females (.048). Also, slightly more influential than math affinity for black females is father's education (.227) which is positive and significant for black females, but not significant for black males (-.086).

In contrast, mother's education is among the three most significant determinants of high school math preparation for black males (.214). However, mother's education does not significantly affect the high school math preparation of black females (-.026).

Other interesting sex differences for black males and females include high school race, high school curriculum, high school grades, math encouragement, and educational expectations. The significant positive effects of high school race for black males (.128) suggests that attending a predominantly white high school is positively related to enrollment in advanced high school math for black males. However, high school race does not have a significant effect on high school math enrollment for black females (.008). Second, the effects of being in a college preparatory curriculum on advanced high school math enrollment is significant for black females (.153) but not significant for black males (.071). Third, although high school grade performance is among the three most significant variables affecting high school math enrollment for black males and black females, its impact is stronger for black males (.113) than for black females (.084). Finally, receiving encouragement to major in math and having high educational expectations are significantly related to advanced high school math enrollment for black females (.143 and .167) but not for black males (.037 and .002).

Although high school control, exposure to math role models, high school study time, and occupational expectations were hypothesized to have an effect on high school math enrollment, they were not significant for black males or black females (or for any of the previous groups examined).

Summary

Given the importance of adequate high school math preparation for students' educational and occupational attainment, this study examined factors that influenced the enrollment of black students in advanced high

school math courses (i.e., advanced algebra, trigonometry and calculus). Previous studies have noted the importance of parental education and income, and student scholastic aptitude and academic performance, for competitive college major and career access (Werts, 1966; Davis, 1965; Sells, 1980). However, it was hypothesized that once these objective factors were controlled, black students' interest in and affinity for math would be critical in determining their enrollment in advanced high school math courses. This hypothesis was supported by the data for the total sample of black students, for black males and black females, and for black students in predominantly black and predominantly white colleges.

Parental education and high school grade performance were also significant determinants of high school math enrollment for the various groups examined. Specifically, father's education was a significant factor for black females and for black students in black colleges, while mother's education was a significant factor for black males and for black students in white colleges. Regarding sex differences, high school curriculum (i.e., being in an academic track) was a significant factor affecting high school math enrollment for black females, while attending a predominantly white high school (rather than high school curriculum) was a significant factor for black males. Also, educational expectations and encouragement to major in math were significant determinants of high school math enrollment for black females but not for black males.

Conclusions and Implications

The major finding of this study--the importance of math affinity for advanced high school math enrollment--clearly implies that increasing black students' interest in and appreciation for math is critical to expanding their enrollment in these courses. Furthermore, the successful access to and performance of black students in advanced high school math is

important for access to competitive college majors and careers. Thus, junior and senior high school math and science curriculums may need to be restructured and expanded to include more interesting, innovative and applied methods of teaching math and science.

Recommendations by the National Commission on Excellence in Education (1983) have emphasized strengthening the academic, rather than the innovative, content of high school curriculums to improve students' basic math and science skills. However, studies by Young (1983) and Matthews (1983) show that many academically-able black and female students do not pursue advanced math courses and math- and science-related majors. Young (1983) noted that these youngsters do not view these subjects as highly relevant to their daily lives and social and career aspirations. Fisher (1983) and others (Young and Young, 1974) have identified various experiential and applied learning approaches for making math and science more interesting and applicable to minority students.

Although this study stresses affective intervention (i.e., appealing to the interest and motivation of black students) to improve their "math readiness" and access to more competitive careers, this does not preclude the continuing efforts needed to increase the math and science performance of black students and their enrollment in college-preparatory curriculums. Other data from this study (not presented) revealed that a higher percentage of blacks were enrolled in non-academic curriculums, took fewer advanced high school math and science courses, had lower high school math and science grades, and were majoring in less competitive fields (i.e., education, social work, nursing and the social sciences) than whites. Thus, improving the academic performance of black students to increase their access to math and science courses relevant to college and more competitive major field access is certainly a continuing need.

The lower enrollment of black college females in advanced high school math than black college males, and the importance of father's education and adult encouragement for their enrollment in these courses, suggest that black females need greater support and encouragement to major in these fields. Also, sex role resocialization and re-education may be especially important for black females from low socioeconomic status backgrounds and from traditionally female-headed homes.

References

Angle, J. and Wissman, D. A.
1981 "Gender, college major, and earnings." Sociology of Education 54: 25-33.

Angrist, S. S. and E. M. Almquist
1975 Careers and Contingencies: How College Women Juggle with Gender. New York: Dunellen.

Astin, H. S.
1974 "Sex differences in mathematical and scientific precocity. In J. C. Stanley, D. P. Keating, and L. Fox (Eds.), Mathematical Talent: Discovery, Description, and Development. Baltimore, MD: Johns Hopkins University Press.

Benbow, C. P. and J. C. Stanley
1980 "Sex differences in mathematical ability: Fact or artifact?" Science 210: 1262-1264.

Blackwell, J. E.
1981 Mainstreaming Outsiders: The Production of Black Professionals. Bayside, New York: General Hall, Inc.

Braddock, J. and J. McPartland
1979 The Effects of Elementary-Secondary School Desegregation on Black Student Attendance and Persistence at Traditionally White Four-Year Colleges. Baltimore, MD: Center for Social Organization of Schools, Johns Hopkins University.

Brown, Frank and Madelon D. Stent
1977 Minorities in U.S. Institutions of Higher Education. New York: Praeger.

Brush, L. R.
1980 Encouraging Girls in Mathematics: The Problem and the Solution. Cambridge, MA: ABT Associates.

Carnegie Commission on Higher Education
1973 Opportunities for Women in Higher Education. New York: McGraw-Hill.

Casserly, P.
1975 An Assessment of Factors Affecting Female Participation in Advanced Placement Programs in Mathematics, Chemistry, and Physics. Washington, DC: National Science Foundation.

Coleman, James, Thomas, Hoffer and Sally Kilgore
1981 Public and Private Schools. Washington, DC: National Center for Education Statistics.

College Placement Council
1982 CPC Salary Survey: A Study of 1982-83 Beginning Offers. Bethlehem, PA: College Placement Council.

Crain, Robert
1971 "School integration and the academic achievement of Negroes." Sociology of Education 44; 1-26.

Crain, Robert and Rita Mahard
1978 The Influence of High School Racial Composition on Black College Attendance and Test Performance. Washington, DC: National Center for Education Statistics.

David, James
1965 Undergraduate Career Decisions. Chicago: Aldine Publications.

Fisher, Harold
1983 The Relative Effectiveness of Performance Practice and Formal Study on Acquisition of Aptitude in Engineering in Precollege Engineering Programs for Minorities, Paper Presented at the American Education Research Association Meetings, Toronto.

Fox, Lynn
1976 "Women and the career relevance of mathematics and science." School Science and Mathematics 26: 347-353.

Fox, Lynn and Susanne A. Denham
1974 "Values and career interests of mathematically and scientifically precocious youth." In Julian Stanley, Daniel Teating and Lynn Fox (Eds.), Mathematical Talent. Baltimore, MD: Johns Hopkins University Press.

Gurin, Patricia and Edgar Epps
1975 Black Consciousness, Identity and Achievement. New York: John Wiley.

Hauen, E. W.
1971 Factors Associated with the Selection of Advanced Academic Mathematics Courses by Girls in High School. Penn. University of Pennsylvania (Dissertation Abstracts).

Jackson, K. W.
1982 Achievement Differences in Mathemaitcs: A Search for Causal Explanations. Houston, Texas. Rice University (Dept. of Sociology).

Kerlinger, F. and E. J. Pedhazur
1973 Multiple Regression in Behavioral Research. New York: Holt, Rinehart and Winston.

Malcom, S. M., P. Q. Hall and J. W. Brown
1976 The Double Bind: The Price of Being a Minority Woman in Science. Washington, DC: American Association for the Advancement of Science.

Marrett, Cora B.
1981 Patterns of Enrollment in High School Mathematics and Science. Madison, Wisconsin: Wisconsin Research and Development Center.

Matthews, Westina
1983 Influences on the Learning and Participation of Minorities in Mathematics. Wisconsin: Wisconsin Center for Education Research.

Meece, J. L., J. E. Parsons, C. M. Kaczala and R. Futterman
1982 "Sex differences in math achievement: Toward a model of academic choice." Psychological Bulletin 91: 324-348.

Metz, Stafford A. and Charles H. Hammer
1981 Labor Force Status of Recent College Graduates. Washington, DC: National Center for Education Statistics.

National Commission on Excellence in Education
1983 A Nation at Risk: The Imperative for Educational Reform. Washington, DC: The National Commission on Excellence in Education.

Parsons, J. E., Alder, T. F. and C. Kaczala
1983 "Socialization of achievement attitudes and beliefs: Parental influences." Child Development (In Press).

Persell, C. H.
1977 Education and Inequality. New Jersey: The Free Press.

Portes, A. and K. L. Wilson
1976 "Black-white differences in educational attainment." American Sociological Review 41: 414-431.

Rosenbaum, J. E.
1976 Making Inequality. New York: John Wiley.

Rosenfeld, Rachel A.
1980 "Race and sex differences in career dynamics." American Sociological Review 45: 583-609.

Sells, Lucy
1980 "The mathematics filter and the education of women and minorities." In L. H. Fox, L. Brody and D. Tobin (Eds.), Women and the Mathematical Mystique. Baltimore, MD: Johns Hopkins University Press.

Sherman, J. and E. Fennema
1977 "The study of mathematics by high school girls and boys: Related variables. American Educational Research Journal 14: 159-168.

Thomas, G. E., K. Alexander and B. K. Eckland
1979 "Access to higher education: The importance of race, sex, social class, and academic credentials." School Review 87: 133-156.

Thomas, G. E.
1979 "The influence of ascription, achievement, and educational expectations on black-white postsecondary enrollment." The Sociological Quarterly 20: 209-222.

Thomas, G. E.
1980 "Equality of representation of race and sex groups in higher education: Institutional and program enrollment statuses." American Educational Research Journal 17: 171-181.

Thomas, G. E. and J. H. Braddock
1981 Determining the College Destination of Black Students. Atlanta, GA: Southern Education Foundation.

Thomas, G. E.
1981 Choosing a College Major in the Hard and Technical Sciences and the Professions. Baltimore, MD: Center for Social Organization of Schools. Johns Hopkins University.

Thomas, G. E.
1983 Preliminary Analyses from MFS Study on Race-Sex Differences in Major Field Choice. Baltimore, MD: Presentation at Center for Social Organization of Schools. Johns Hopkins University.

Thomas, G. E., S. Gordon, and C. Baldwin
1983 Evaluating the Payoffs of College Investments for Black, White and Hispanic Students. Baltimore, MD: Center for Social Organization of Schools (forthcoming Report).

Vetters, R.
1977 Some statistical comments on Women Doctoral Scientists and Engineers. Washington, D.C.: American Association for the Advancement of Science.

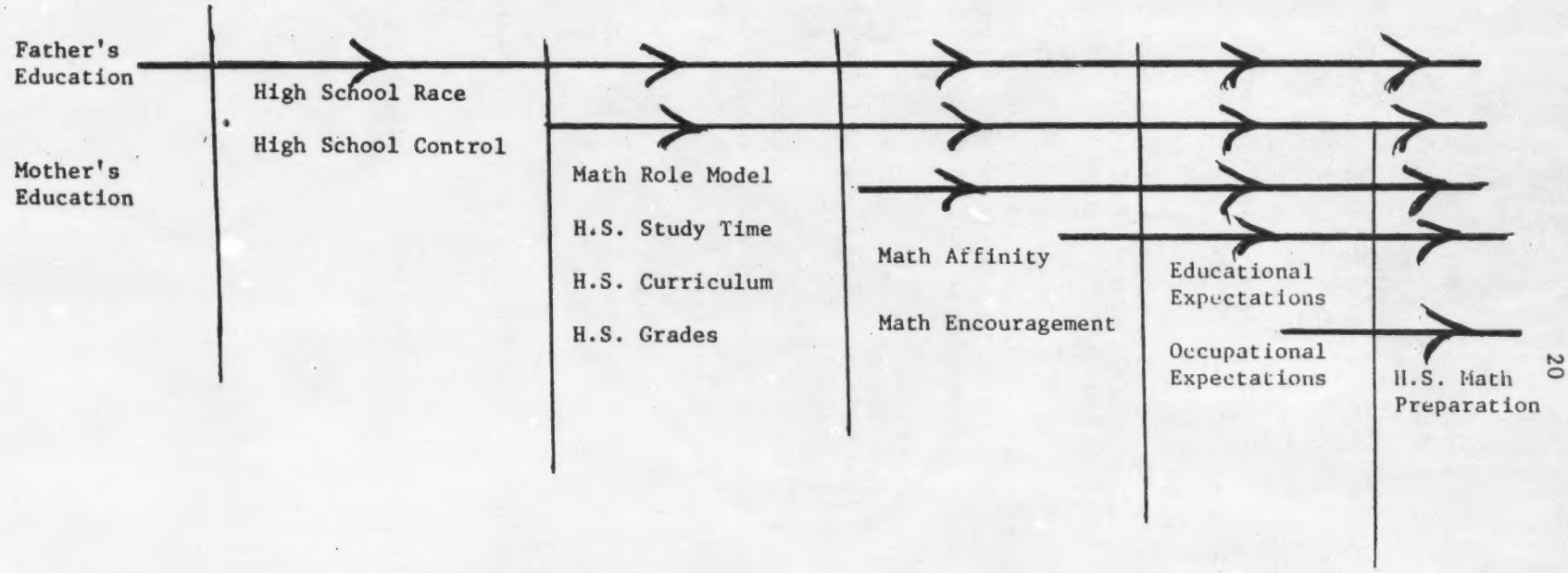
Werts, C. E.
1966 Career Changes in College. Evanston, IL: National Merit Scholarship Scholarship Corporation, Research Report 2.

Young, H. A. and B. H. Young
1974 Scientists in the Black Perspective. Louisville, Kentucky: The Lincoln Foundation.

Young, H. A.
1983 Cultural Differences that Affect Retention of Minorities on Predominantly White Campuses. American Education Research Association (Presentation, Toronto).

Figure 1

Model Predicting Advance High School Math Preparation for Black College Students[a]



[a]The causal relationships between the independent variables are not examined because primary interest is in the relationship between the independent variables and the major dependent variable, high school math preparation.

Table 1

Determinants of High School Math Preparation
for Black Four-Year College Students
(Total Sample N=927)[a]

Independent Variables	(1) H.S. Math. Prep.	(2) H.S. Math. Prep.	(3) H.S. Math. Prep.	(4) H.S. Math. Prep.	(5) H.S. Math. Prep.	(6) H.S. Math. Prep.
Sex	.123*[b]	.119*	.153*	.136*	.134*	.115*
Father's Education	.162*	.152*	.120*	.129*	.136*	.126*
Mother's Education	.077[c]	.081	.077	.079	.075	.055
High School Race	.054	.055	.047	.064	.068	.053
High School Control	.026	.025	.023	.021	.022	.022
Math Role Model		.084*	.073	.054	.034	.021
High School Study Time		.001	-.033	-.060	-.062	-.067
High School Curriculum			.135*	.135*	.131*	.122*
High School Grades			.272*	.211*	.207*	.182*
Math Affinity				.265*	.244*	.246*
Math Encouragement					.102*	.107*
Educational Expectations						.120*
Occupational Expectations						.039
R^2	.078	.085	.178	.243	.252	.269

[a]Analysis is based on SPSS subprogram regression option Pairwise Deletion. The number of cases for the total sample ranged from 726 to 927. The N reported above is for the dependent variable.

[b]Coefficients are twice their standard error.

[c]Coefficients reported are standardized regression coefficients.

Table 2

Item Means and Standard Deviation
for Model Predicting High School Math Preparation[a]

Variables[b]		Total Sample	Blacks in Black Collgs.	Blacks in Wht. Collgs.	Black Males	Black Females
Sex	$\bar{X}$	.279	.276	.298	--	--
	S.D.	.045	.447	.459	--	--
Father's Ed.	$\bar{X}$	2.781	2.796	2.690	2.972	2.706
	S.D.	1.788	1.783	1.823	1.871	1.751
Mother's Ed.	$\bar{X}$	3.019	3.050	2.839	3.130	2.978
	S.D.	1.743	1.761	1.633	1.828	1.712
H.S. Race	$\bar{X}$	2.468	2.418	2.780	2.601	2.417
	S.D.	1.403	1.391	1.446	1.416	1.396
H.S. Control	$\bar{X}$	.113	.112	.123	.126	.109
	S.D.	.317	.215	.329	.332	.311
Math Role Model	$\bar{X}$	.238	.247	.179	.265	.229
	S.D.	.267	.270	.237	.299	.253
Study Time	$\bar{X}$	3.362	.385	3.210	3.062	3.476
	S.D.	1.053	1.061	.990	1.011	1.048
H.S. Curriculum	$\bar{X}$	.886	.881	.918	.855	.898
	S.D.	.318	.324	.274	.661	.303
H.S. Grades	$\bar{X}$	4.044	4.020	4.203	3.937	4.086
	S.D.	.638	.641	.600	.661	.625
Math Affinity	$\bar{X}$	3.830	3.865	3.605	3.872	3.814
	S.D.	1.284	1.268	1.366	1.264	1.129
Math Encourag.	$\bar{X}$	.363	.373	.301	.382	.357
	S.D.	.481	.484	.461	.487	.480
Ed. Expt.	$\bar{X}$	3.249	3.260	3.181	3.351	3.321
	S.D.	.755	.751	.776	.733	.744
Occp. Expt.	$\bar{X}$	72.576	72.640	72.153	76.835	70.986
	S.D.	13.543	13.716	12.412	12.361	13.640
Math Prep.	$\bar{X}$	.330	.325	.355	.400	.301
	S.D.	.315	.315	.317	.305	.315

[a]Analysis based on SPSS's subprogram regression option Pairwise Deletion. The number of cased for the total sample ranged from 726 to 972; for blacks in black colleges 630-803; for blacks in white college 96 to 124; for black males, 199 to 258, for black females, 526 6o 668.

[b]See description of variables in the text for a definition of variables and variable codings.

Table 3

Determinants of High School Math Preparation for Blacks in Black Colleges (N-=803) versus Blacks in White Colleges (N=124)[a]

Independent Variables	Blacks in Black Colleges	Blacks in White Colleges
Sex	.085[b]	.063
	.121*	.091
Father's Education	.027	-.006
	.156*[c]	-.036
Mother's Education	.004	.040
	.023	.208*
High School Race	.013	-.000
	.056	-.003
High School Control	.017	.004
	.017	.005
Math Role Model	.046	-.118
	.040	-.088
High School Study Time	-.022	-.001
	-.074	-.006
High School Curriculum	.107	.248
	.110*	.214*
High School Grades	.083	.144
	.168*	.272*
Math Affinity	.062	.062
	.248*	.267*
Math Encouragement	.067	.103
	.104*	.149*
Educational Expectations	.053	.066
	.125*	.162*
Occupational Expectations	.001	.001
	.046	.048
R^2	.272	.325

[a]Analysis based on SPSS subprogram regression option Pairwise Deletion. The number of cases for blacks in black colleges ranged from 630-803; for blacks in white colleges from 96 to 124.

[b]The top coefficients are the unstandardized values and the bottom coefficients are the standardized (beta) coefficients.

[c]Coefficients are twice their standard error.

Table 4

Determinants of High School Math Preparation for Black Males (N=258) and Black Females (N=668) in Four Year Colleges[a]

Independent Variables	Black Males	Black Females
Father's Education	-.141[b]	.041
	-.086	.227*
Mother's Education	.036	-.005
	.214*[c]	-.026
High School Race	.027	.002
	.128*	.008
High School Control	-.031	.044
	-.034	.044
Math Role Model	.066	-.004
	.065	-.003
High School Study Time	-.036	-.020
	-.120	-.067
High School Curriculum	.062	.159
	.071	.153*
High School Grades	.113	.084
	.244*	.167*
Math Affinity	.083	.048
	.346*	.197*
Math Encouragement	.023	.094
	.037	.143*
Educational Expectations	.000	.071
	.002	.167*
Occupational Expectations	.001	.000
	.045	.040
R^2	.301	.280

[a]Analysis based on SPSS subprogram regression option Pairwise Deletion. The number of cases for black males range from 199 to 258; for black females from 526 to 668.

[b]The top coefficients are the unstandardized values and the bottom coefficient are the standardized (beta) coefficients.

[c]Coefficients are twice their standard error.